PCT/GB2003/003851

INVESTOR IN PEOPLE

The Patent Office
Concept House
Cardiff Road
Newport
South Wales
NP10 8QQ

PRIORITY DOCUMENT
SUBMITTED OR TRANSMITTED IN
COMPLIANCE WITH
RULE 17.1(a) OR (b)

REC'D 22 DEC 2003
WIPO PCT

I, the undersigned, being an officer duly authorised in accordance with Section 74(1) and (4) of the Deregulation & Contracting Out Act 1994, to sign and issue certificates on behalf of the Comptroller-General, hereby certify that annexed hereto is a true copy of the documents as originally filed in connection with the patent application identified therein.

In accordance with the Patents (Companies Re-registration) Rules 1982, if a company named in this certificate and any accompanying documents has re-registered under the Companies Act 1980 with the same name as that with which it was registered immediately before re-registration save for the substitution as, or inclusion as, the last part of the name of the words "public limited company" or their equivalents in Welsh, references to the name of the company in this certificate and any accompanying documents shall be treated as references to the name with which it is so re-registered.

In accordance with the rules, the words "public limited company" may be replaced by p.l.c., plc, P.L.C. or PLC.

Re-registration under the Companies Act does not constitute a new legal entity but merely subjects the company to certain additional company law rules.

Signed

Dated 16 December 2003

Patents Form 1/77
Patent Acts 1977
(Rule 16)

THE PATENT OFFICE
A
- 6 SEP 2002
RECEIVED BY FAX

06SEP02 E746480-1 D02716
P01/7700 0.00-0220751.2

The Patent Office

Request for grant of a patent

1/77

The Patent Office
Cardiff Road
Newport
Gwent NP10 8QQ

1. Your reference — NC 33809 GB

2. Patent application number — ~~06 SEP 2002~~ 0220751.2

3. Full name, address and post code of the or of each applicant

   NOKIA CORPORATION
   Keilalahdentie 4
   02150 Espoo
   Finland

   Patents ADP Number — 765227003

   If the applicant is a corporate body, give the country/state of its incorporation — Finland

4. Title of the invention — A CAMERA CONNECTOR

5. Name of your agent
   "Address for service" in the United Kingdom to which all correspondence should be sent

   Nokia IPR Department
   Nokia House, Summit Avenue
   Farnborough, Hants
   GU14 ONG
   7577638001

   Patents ADP number

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and the or each application number

Country	Priority Application Number	Date of Filing

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application	Date of Filing

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer 'Yes' if:

   a) any applicant named in part 3 is not an inventor, or
   b) there is an inventor who is not named as an applicant, or
   c) any named applicant is a corporate body.

   Yes

Patents Form 1/77

9. Enter the number of sheets for any of the following items you are filing with this form. Do not count copies of the same document

Continuation sheets of this form

THE PATENT OFFICE
A
-6 SEP 2002
RECEIVED BY FAX

Description	4
Claims(s)	1
Abstract	0
Drawing(s)	4

10. If you are also filing any of the following state how many against each item.

Priority documents

Translation of priority documents

Statement of inventorship and right to grant of a patent (Patents Form 7/77)

Request for preliminary examination and search (Patents Form 9/77)

Request for substantive examination (Patents Form 10/77)

Any other documents (please specify)

11. I/We request the grant of a patent on the basis of this application.

Signature K Jones Date 6/9/02

Kendra Jones

12. Name and daytime telephone number of person to contact in the United Kingdom

~~Kendra Jones - 01252 865306~~
James Seymour
01771 940878

A Camera Connector

This invention relates to a connector for connecting an electrical component such as a digital camera module to external circuitry.

Background

Digital camera modules have been developed as components for use in electronic apparatus such as personal digital assistants (PDAs) and mobile telephones.

Figures 1 and 2 illustrate such a digital camera module 100. Figure 1 is a perspective top view of the module, and Figure 2 is a bottom plan view of the module. The module 100 comprises a substrate 110 and a lens structure 130.

The substrate 110 may be a rectangular-shaped ceramic substrate comprising electronic circuitry including an image sensor (not shown) on a top surface, and metallic terminals 114 on a bottom surface 112 for electrically coupling the module 100 to external circuitry.

The lens structure 130 comprises rectangular-shaped base portion 135, and a turret portion 150 extending from the base portion 135. The base portion 135 and the turret portion 150 may both be formed of plastic. The turret portion 150 defines an aperture 160 through which light is received into the camera module for detection by the image sensor. A lens 170 is positioned within the aperture 160 for focusing received light onto the image sensor.

A drawback with known digital camera modules is that they are difficult to connect to printed wiring boards (PWBs). Reflow soldering of the ceramic substrate terminals 114 to a PWB is problematic as the plastics used in the lens 170 melt at temperatures less than the reflow temperatures. Reflow soldering

may be possible if the lens is made from a glass material. However, glass lenses are expensive and are less suitable for mass production techniques.

One method for connecting a digital camera module to a PWB involves using a flexible intermediate substrate. The flexible substrate is glued at one end to the bottom surface 112 of the ceramic substrate 110 with locally-conductive adhesive such that the substrate terminals 114 electrically couple to electrical traces in the flexible substrate. The other end of the flexible substrate is then connected to the PWB via a FPC connector. This method is labor intensive and does not lend itself to automated assembly easily.

Summary of the Invention

According to the present invention there is provided a connector for coupling a component to external circuitry, comprising a base, a guide for guiding the component along an axis towards the base, a first barb positioned to latch an edge of the component at a first distance along the axis from the base, and a second barb positioned to latch an edge of the component at a second distance along the axis from the base.

A connector in accordance with the invention has the advantage that it is able to receive components along one axis which in turn enables simple assembly of the component to the connector. A connector in accordance with the invention also has the advantage that it is able to receive components that have housings of different height due to the double clip or barb arrangement.

The component is preferably a digital camera module.

Suitably, the base includes electrical interconnects for coupling to the component/digital camera module.

Preferably, the guide comprises side walls extending from the base.

Description of a Preferred Embodiment

Figure 3 is a plan view of a connector 200 in accordance with the invention. The connector is made of a plastics material and is shaped generally like box having an open top. Figure 4 is a side view of the connector 200 and Figure 5 is an end view.

The connector 200 comprises a base 220 and four side walls 210 extending perpendicular to the base to form the open box shape.

As shown in Figure 4, the connector 200 is designed to receive the camera module 100 of Figures 1 and 2 along the Z-axis. Eight electrical interconnects 230 made of metal such as copper are embedded into the base 220 such that each interconnect has a internal portion extending to the inside of the box, and a external portion extending to the outside of the box. The internal portions are designed to couple to the terminals 114 of the camera module once it has been fully inserted into the connector 200. The external portions are designed to be soldered to traces of a PWB in order to provide electrical connections to external components. The connector 200 is preferably reflow soldered to the PWB before the camera module 100 is received into the connector.

As shown in Figures 2 and 3, the external dimensions l and w of the rectangular-shaped base portion 135 of the camera module 100 are slightly smaller than the internal dimensions l and w of the connector box opening defined by the side walls 210. The side walls 210 thus act as guides to guide the camera module 100 into the connector along the Z-axis.

It is important that the camera is held in the connector so that the terminals 114 remain coupled to the interconnects 230. Figures 6 to 9 illustrate the clips or barbs that form part of the connector 200 to achieve this function.

Figure 6 illustrates an embodiment with four barbs 241, 242, 243, 244 while Figures 7 to 9 illustrate an embodiment with just two barbs. The barbs are supported by arms that extend from the base 220 of the connector. The arms/barbs are designed to move independently of each other. Recesses in the side walls 210 allow the arms/barbs to spring back as the camera module is received into the connector 200.

In Figure 6, the two lower barbs 243, 244 of the of four barbs are positioned at a distance h1 from the base 220, while the two upper barbs 241, 242 are positioned at a distance h2 from the base 220.

The height of the camera module hCAM (see Fig. 1) is known to have a large tolerance due to variations in the alignment of the lens structure 130 to the substrate 110. The use of barbs at different heights enables the connector 200 to receive and retain camera modules that vary greatly in height. Preferably the upper barb is positioned at a height h2 that is near the maximum tolerance for hCAM while the lower barb is positioned at a height h1 that is near the minimum tolerance for hCAM.

Figure 8 illustrates how the connector 200 according to the invention can retain a camera module that has a large height hCAM by means of the upper barb 261. The lower barb 262 is simply deflected out of the way. Figure 9 in contrast illustrates how the connector 200 according to the invention can retain a camera module that has a smaller height hCAM by means of the lower barb 262.

Claims:

1. A connector for coupling a component to external circuitry, comprising a base, a guide for guiding the component along an axis towards the base, a first barb positioned to latch an edge of the component at a first distance along the axis from the base, and a second barb positioned to latch an edge of the component at a second distance along the axis from the base.

2. A connector as claimed in claim 1, wherein the component is a digital camera module.

3. A connector as claimed in claim 1 or 2, wherein the base includes electrical interconnects for coupling to the component.

4. A connector as claimed in claim 1, 2 or 3, wherein the guide comprises side walls extending from the base.

1/4

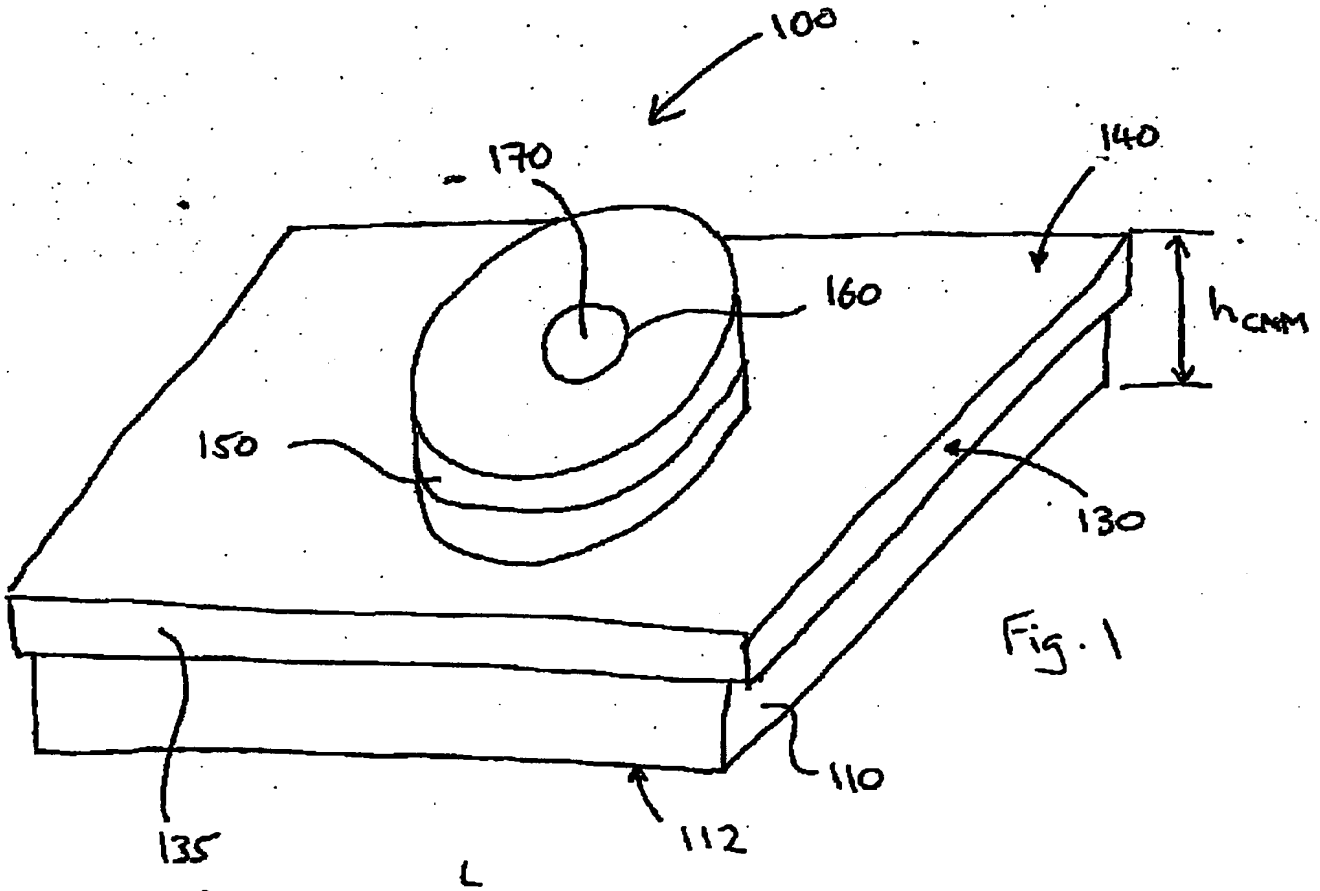


Fig. 1

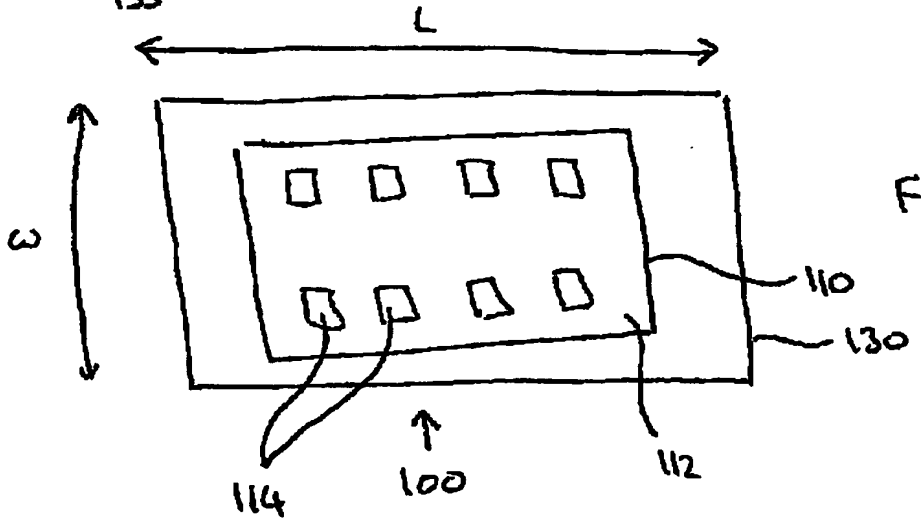


Fig. 2

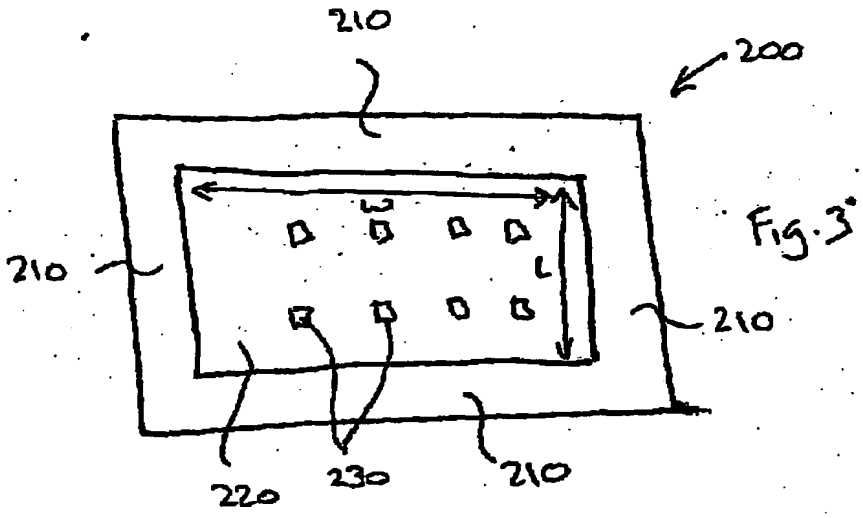


Fig.3

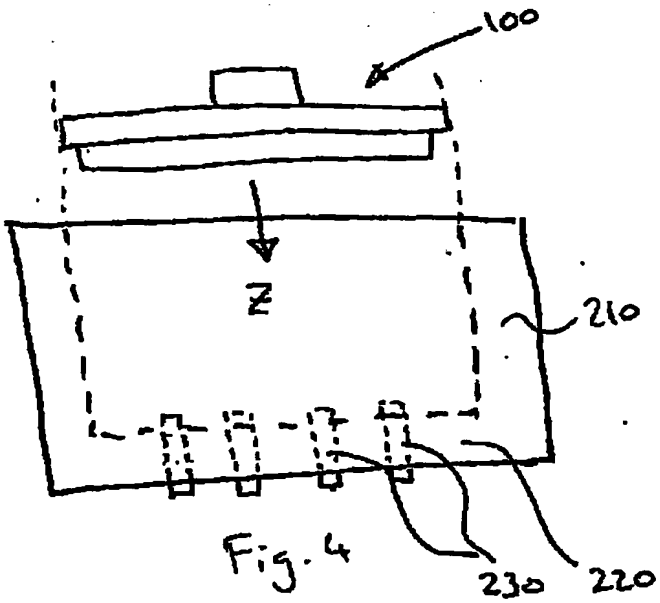


Fig.4

Fig.5

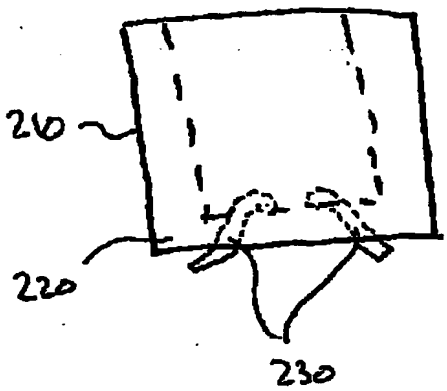
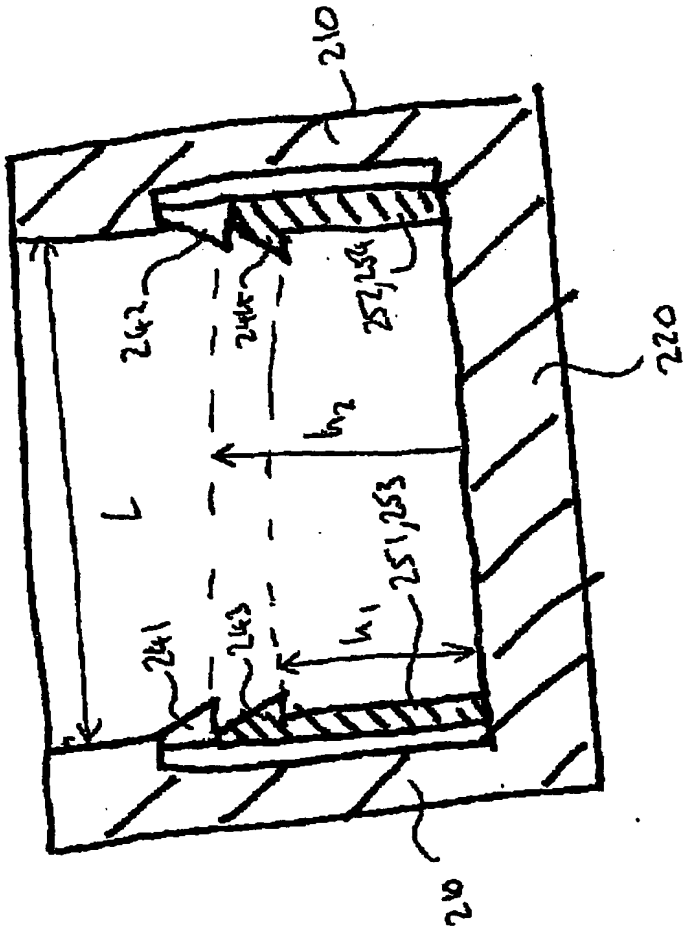


Fig.6



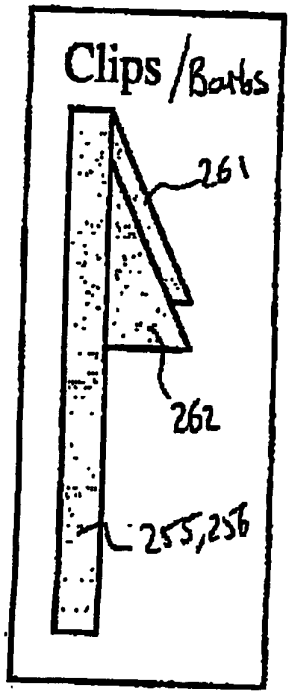


Fig.7

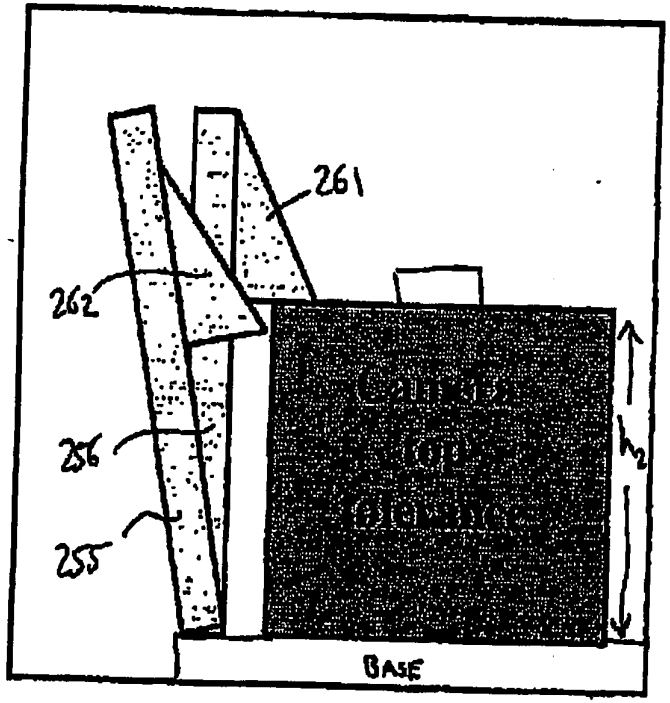


Fig.8

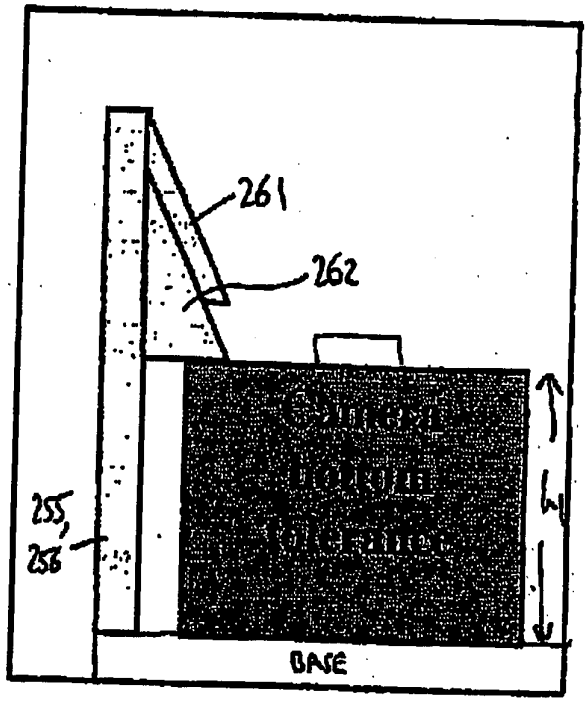


Fig.9